

DRAWINGS

Formal Drawings

The indication by the Examiner in the recent Office Action that the formal drawings filed on September 16, 1003 were approved by the Draftsman is noted with appreciation.

REMARKS/ARGUMENTS

Claim History

The Examiner rejected claims 1-26 under 35 U.S.C. § 102 as being anticipated by Tillerot et al. The cancellation of claims 21 and 26 by the present amendment serves to render this particular grounds of rejection moot with respect to claims 21 and 26.

Status

Claims 21 and 26 have been cancelled by the present amendment and claims 27 and 28 have been added. Claims 1-20, 22-25 and 27 and 28, including independent claims 1, 10, 13 and 20, will remain for further consideration.

More Clearly Defined

The claims in this application have been revised to voluntarily further clarify Applicant's unique invention. Applicant maintains that the claims as filed were patentable over the art of record. However, to expedite issuance of this application, reconsideration of the claims in light of the amendments and for the following reasons is respectfully requested.

35 U.S.C. § 102

The Examiner rejected claims 1-26 under 35 U.S.C. § 102 as being anticipated by Tillerot et al. This rejection is respectfully traversed.

The present invention is to an apparatus and method for reducing the number of filters required in an all optical cross-connect apparatus. By moving some or all of the

filters from the myriad of cross-connect paths to the input and output paths leading to or from the cross-connect, it is possible to adequately filter the signals in the paths while significantly reducing the number of filters required. The number of filters required for connecting N diverse paths within a cross-connect is a function of the quadratic of the number of paths (i.e., $N^*(N-1)$ or $N^2 - N$). According to the present invention, the number of filters required to connect N diverse paths by moving the filters outside of the cross-connect is only $2N$. As can be seen, as N increases, the reduction in the number of required filters, such as blocking filters in a optical system, can be significant.

The Examiner has cited Tillerot et al. ("Tillerot") as anticipating the present invention. Tillerot shows the opposite of the present invention, namely, the reference shows an optical cross-connect having filters outside and inside a cross-connect, needlessly duplicating filtering and resulting in a sub-optimal number of filters. Each path in the Tillerot system has a filter F on the input path to the cross-connect as well as a filter 22 (or 34 in the embodiment of Figure 7) on each path within the cross-connect. Nowhere does Tillerot et al. show, teach or anticipate the reduction of the number of filters by removing filters from the cross-connect and distributing them across the network.

Specifically, claim 4 as originally filed, and which has been rewritten in independent form by the present amendment, recites "wherein there are no optical filters within said optical cross-connect." This is nowhere shown by Tillerot. Each path of Tillerot has a filter 22 within the cross-connect. Figure 7 of Tillerot shows a further embodiment, but again, each path after the demultiplexers d1-dM is sent through a filter 32 and a filter 34. Nowhere does Tillerot show a path having "no optical filters ... within said optical cross-connect." Nor does Tillerot show the removal of optical filters from within the cross-connect to a position outside the cross-connect to significantly alter the number of filters

required in the system. For at least these reasons, claim 4 should be allowed over the prior art of record.

Claim 1 as presently amended recites that at least one cross-connect path does not have a filter with said cross-connect in optical communication therewith. In other words, one path must not have a filter within said cross-connect filtering the path. Again, filtering has been distributed efficiently across the network by placing a filter on the input to the cross-connect or the output or both, thereby getting rid of the requirement that each path within the cross-connect be filtered. This is not shown in Tillerot for the reasons discussed above, and for at least this reason, claim 1 should be allowed over the art of record.

Claims 2 further recites optical splitters and optical combiners coupled within said optical cross-connect to broadcast and combine the signals. Claim 28 depending from claim 2 further recites that there are no filters between said optical splitter and said optical combiner. Claim 3 further recites that the optical splitter and combiner are connected between said optical input and said optical output. Claims 5-9, 20 and 22-25 further define the cross-connect of the present invention. These claims should be allowed for at least the same reason that the independent claim from which they depend, namely, claim 1, is allowed. Applicant further notes that these claims have additional recitations not found in the prior art.

Claim 10 recites a method of optimizing the cross connecting of optical inputs and outputs by providing a cross-connect, optically filtering an optical input or an optical output, and by providing an unfiltered signal path in at least one path within said cross-connect. The claims should be allowed for at least the same reasons as above, as Tillerot does not show unfiltered paths through a cross-connect where the input or output are filtered

outside of the cross-connect. Claims 11 and 12 depend from claim 10 and should be allowed for at least the same reason that claim 10 is allowed. Applicant further notes that these claims have additional recitations not found in the prior art.

Claim 13 recites an optical cross-connect apparatus in which each path that exists between a particular optical input and a particular optical output is filtered at the input or output, and at least one of the paths does not have a filter within the cross-connect. For the reasons explained above, Tillerot et al. does not show a path through a cross-connect that is unfiltered within the cross connect, and therefore claim 13 should be allowable for the same reasons. Claim 27, depending from claim 13, further recites that each path has a unique optical input filter and optical output filter filtering only that path. Claims 14-15 depend from claim 13 and should be allowed for at least the same reason that claim 13 is allowed. Applicant further notes that these claims have additional recitations not found in the prior art.

Claim 16 further recites that there are no optical filters included with said optical cross-connect. Claim 17 further recites that substantially all of the paths do not have a filter within said cross-connect. Claim 18 further recites that the total number of filters is equal to twice the number of paths, namely the number of filters required to filter all of the paths when the filters are placed outside of the cross-connect. Claim 19 further recites that the total number of filters is less than $N^*(N-1)$, where N is the number of paths and namely less than the number of filters that would be required if all of the internal paths through the cross-connect were filtered. As discussed above, Tillerot shows only filtered paths through the cross-connect, and therefore claims 16-19 should be allowed over the art of record for these reasons, and for the reasons discussed above with respect to claim 14 from which these claims depend.

Summary

Applicants have made a diligent and bona fide effort to answer each and every ground for rejection or objection to the specification including the claims and to place the application in condition for final disposition. Reconsideration and further examination is respectfully requested, and for the foregoing reasons, Applicant respectfully submits that this application is in condition to be passed to issue and such action is earnestly solicited. However, should there remain unresolved issues that require adverse action, it is respectfully requested that the Examiner telephone Robert N. Blackmon, Applicants' Attorney at 703-684-5633 to satisfactorily conclude the prosecution of this application.

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Respectfully submitted,



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